A. Amendments to the Claims

Claim 1 (currently amended): An apparatus in a distributed control system, comprising:

a first network interface for communicating with a first network having a communication protocol stack; and

a High Speed Ethernet core further comprising:

a device access agent which emulates mapping of an access sublayer of at least one legacy format service message of said distributed control system to one or more network format messages compatible with said communication protocol stack using a common access interface; whereupon mapping of the at least one legacy format service message to one or more network format messages, the one or more network format messages are communicated to at least one second apparatus connected to the first network, wherein both the apparatus and the at least one second apparatus actively control respective functions performed by the distributed control system.

Claim 2 (currently amended): The apparatus according to claim 1, wherein:

said first network comprising an ~~commercial off-the-shelf~~ Ethernet network.

Claim 3 (original): The apparatus according to claim 2, further comprising:

a high speed Ethernet management agent for managing transport control protocol, user data protocol, and Internet protocol layers of said communication protocol stack; and

a high speed Ethernet management agent interface through which said device access agent communicates with said high speed Ethernet management agent.

Claim 4 (original): The apparatus according to claim 3, further comprising:

a user data protocol local interface through which said device access agent communicates with a user data protocol layer of said communication protocol stack.

Claim 5 (original): The apparatus according to claim 4, further comprising:

a transport control protocol local interface through which said device access agent communicates with a transport control protocol layer of said communication protocol stack.

Claim 6 (original): The apparatus according to claim 5, wherein said high speed Ethernet management comprises:

a management information base constructed with a standardized structure to thereby allow an open and interoperable profile, and to make said apparatus to appear as a well behaved node.

Claim 7 (original): The apparatus according to claim 1, further comprising:

a network management information base for storing information necessary for managing operation of said distributed control system; and

a network management information base local interface through which said device access agent communicates with said network management information base.

Claim 8 (original): The apparatus according to claim 7, further comprising:

a system management information base for storing system configuration information of said apparatus; and

a system management information base local interface through which said device access agent communicates with said system management information base.

Claim 9 (currently amended): The apparatus according to claim [[8]]1, further comprising:

a system management kernel for configuring said apparatus and storing system configuration information in ~~said~~ a system management information base; and

a system management kernel local interface through which said device access agent communicates with said system management kernel.

Claim 10 (currently amended): The apparatus according to claim 9, further comprising:

a local time clock for providing local time for use within said apparatus; and

a system time clock for providing a system time across said distributed control system;

wherein said system management kernel synchronizes said local time clock with said [[a]] system time clock.

Claim 11 (original): The apparatus according to claim 10, further comprising:

a redundancy entity for sending and receiving diagnostic information; and

a redundancy entity local interface through which said device access agent communicates with said redundancy entity.

Claim 12 (currently amended): The apparatus according to claim 11, wherein:

said first network interface comprises a redundant plurality of first network interfaces;

wherein said first network comprises a redundant plurality of first networks[[:]]; and

wherein said redundancy entity maintains a network status table indicating diagnostic status of said distributed control system to select operational one of said redundant plurality of first network interfaces based on said network status table.

Claim 13 (currently amended): The apparatus according to claim ~~10~~ 1, further comprising:

at least one function block application process virtual field device ~~for~~ providing standardized definitions of at least one of inputs, outputs, algorithms, control variables, and behavior of said distributed control system; and

at least one function block application process virtual field device interface through which said device access agent communicates with said at least one function block application process virtual field device.

Claim 14 (original): The apparatus according to claim 1, further comprising:

a second network interface for communicating with a second network using said at least one legacy format service message.

Claim 15 (cancelled)

Claim 16 (cancelled)

Claim 17 (cancelled)

Claim ~~18~~ 15 (currently amended): An open interoperable apparatus in a distributed control system, comprising:

a redundant plurality of first network interfaces for communicating with respective ones

of a redundant plurality of first networks having a communication protocol stack; and

a High Speed Ethernet core further comprising

a redundancy entity configured to send and receive diagnostic information through said redundant plurality of first network interfaces, said redundancy entity maintaining a network status table indicating diagnostic status of said redundant plurality of first networks, and said redundancy entity being configured to select an operational one of said redundant plurality of first networks based on said network status table.

Claim ~~19~~ 16 (currently amended): The open interoperable apparatus according to claim ~~18,~~ 15 wherein the High Speed Ethernet core further comprises[[ing]]:

a device access agent for mapping at least one legacy format service message of said distributed control system to a network format messages compatible with said communication protocol stack; and

a redundancy entity local interface through which said device access agent communicates with said redundancy entity.

Claim ~~20~~ 17 (original): The open interoperable apparatus according to claim ~~19~~ 16, further comprising:

a system management kernel for configuring said apparatus and synchronizing a local time clock, which provides a local time for use within said apparatus, with a system time clock, which provides a system time across said distributed control system; and

a system management kernel local interface through which said device access agent communicates with said system management kernel.

Claim ~~21~~ 18 (currently amended): An open interoperable distributed control system, comprising:

at least one first network having a communication protocol stack; and

at least one device in communication with said at least one first network, said at least one device having an access agent for mapping at least one legacy format service message of said open interoperable distributed control system to a network format message compatible with said

communication protocol stack; whereupon mapping of the at least one legacy format service message to one or more network format messages, the one or more network format messages are communicated via the at least one first network to at least one second apparatus connected to the at least one first network, wherein both the apparatus and the at least one second apparatus actively control the distributed control system.

Claim 19 (original): The open interoperable distributed control system according to claim 18, wherein: said at least one first network comprises a commercial off-the-shelf Ethernet network.

Claim 20 (original): The open interoperable distributed control system according to claim 18, wherein said at least one device further comprises:

a system management kernel for configuring said apparatus and synchronizing a local time clock, which provides a local time for use within said apparatus, with a system time clock, which provides a system time across the distributed control system; and

a system management kernel local interface through which said device access agent communicates with said system management kernel.

Claim 21 (original): The open interoperable distributed control system according to claim 18, wherein:

said at least one first network comprises a redundant plurality of first networks; and

wherein said at least one device further comprise:

a redundancy entity configured to send and receive diagnostic information to and from said redundant plurality of first networks, said redundancy entity maintaining a network status table indicating diagnostic status of said redundant plurality of first networks, and said redundancy entity being configured to select an operational one of said redundant plurality of first networks based on said network status table.

Claim 22 (original): The open interoperable distributed control system according to claim 21, wherein:

said redundant plurality of first networks comprises a redundant plurality of commercial off-the-shelf Ethernet networks.

Claim 23 (original): The open interoperable distributed control system according to claim 22, further comprising:

a plurality of second networks, each of said plurality of second networks using said at least one legacy service message format;

wherein said at least one device comprises a redundant plurality of devices, each of said redundant plurality of devices comprises:

a plurality of second network interfaces for communicating with said plurality of second networks; and

a redundancy entity configured to provide information necessary for selection of an operational one of said redundant plurality of devices based on a network status table indicating diagnostic status of at least one of said redundant plurality of devices and said at least one first network.

Claim 24 (original): A method of synchronizing a plurality of device specific local times and a system time in an open interoperable distributed control system, said plurality of device specific local times being associated with respective ones of devices in said open interoperable distributed control system, said method comprising:

detecting an end of a previous operational cycle;

providing a start time of a next operational cycle to each of said plurality of devices;

computing an offset between each of said plurality of device specific local times and said system time;

synchronizing each of said plurality of device specific local times with said system time suing said computed offset; and

aligning said plurality of device specific local times with respect to each other so that said start time of said plurality of devices coincide.

Claim 25 (original): The method of synchronizing a plurality of device specific local times and a system time in accordance with claim 24, further comprising:

providing a time master in said open interoperable distributed control system, said time master maintaining a global time;

determining whether said system time is synchronized with said global time; and

setting a synchronized flag if it is determined that said system time is synchronized with said global time.

Claim 26 (original): of synchronizing a plurality of device specific local times and a system time in accordance with claim 24, wherein said step of aligning said plurality of device specific local times comprises:

computing an offset between each of said plurality of device specific local times with respect to each other; and

adding a time delay to at least one of said plurality of device so that said start time of each of said plurality of devices coincide with respect to each other.

Claim 27 (currently amended): An open interoperable apparatus in a distributed control system, the open interoperable apparatus comprising:

a High Speed Ethernet core;

a local time clock for providing a local time for use within said open interoperable apparatus;

a system time clock for providing a system time across said distributed control system; and

a system management kernel for synchronizing said local time clock with said system time clock;

wherein at least one of said local time clock, said system time clock and said system management kernel are utilized by the High Speed Ethernet core to control at least one operation of the open interoperable apparatus wherein information relevant to the at least one operation is mapped by the High Speed Ethernet core from at least one legacy format service message to one

or more network format messages and the one or more network format messages are communicated to at least one second open interoperable apparatus in the distributed control system.

Claim 31 (original): The open interoperable apparatus in accordance with claim 30, further comprising:

a first network interface for communicating with a first network having a communication protocol stack;

a device access agent which emulate mapping of an access sublayer of at least one legacy format service message of said distributed control system to a network format message compatible with said communication protocol stack; and

a system management kernel local interface through which said device access agent communicates with said system management kernel.

Claim 32 (currently amended): An apparatus in a distributed control system, comprising:

a first network interface for communicating with a first network having a communication protocol stack; and

a device access agent that maps an access sublayer of at least one legacy format service message of said distributed control system to a network format message compatible with said communication protocol stack; whereupon mapping of the at least one legacy format service message to one or more network format messages, the one or more network format messages are communicated to at least one second apparatus connected to the first network, wherein both the apparatus and the at least one second apparatus actively control respective functions performed by the distributed control system.

Claim 33 (new): An apparatus for mapping a message in a first format into a second format, wherein the second format is compatible for use with at least one of an H1 fieldbus compatible device and a High Speed Ethernet device comprising:

a High Speed Ethernet management agent;

a protocol stack, under the control of the High Speed Ethernet management agent;

an H1 Interface, for connecting the apparatus to an H1 network, when the apparatus is an H1 fieldbus compatible device; and

a High Speed Ethernet core, further comprising:

a field device access agent which facilitates mapping of messages in the first format into the second format and the mapping of messages in the second format into the first format;

an H1 Interface local interface through which the field device access agent communicates with the H1 interface, when the High Speed Ethernet core is in communication with an H1 fieldbus compatible device.

C1

Claim ~~34~~ 31 (new): The apparatus of claim ~~33~~ 30 wherein the protocol stack further comprises a standard Ethernet stack.

Claim ~~35~~ 32 (new): The apparatus of claim ~~34~~ 31 wherein the High Speed Ethernet core further comprises at least one of a user data protocol local interface, by which the field device access agent communicates with a user data protocol layer of the standard Ethernet stack, and a transport control protocol layer interface by which the field device access agent communicates with a transport control protocol layer of the standard Ethernet stack.